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The Garden in Autumn.

IT is constant change which gives to a good garden its unfailing freshness. It is not repeated over and over from day to day, but transformed from one beauty to another as the year progresses, so that its attractions never become stale or wearisome. One of the fundamental objections against carpet-bedding is its uniformity; all summer long it presents the same figures and the same colors, the same unvarying expression. Flowers bloom and fade, leaves expand and the tender tints of spring pass through the deep greens of summer to the rich glow of autumn, but clipped Coleus and Alternantheras show the same long lines of scarlet and yellow until one tires of looking at the monotonous pattern, while all about it is progression and vicissitude. The part of the garden given over to one of these invariable designs takes no account of the wondrous procession which keeps moving all about it to the close of the year, but where planting has been well considered the garden has a special charm for every season, and a vital relation with all the processes and appearances of nature which environ it.

As the year ripens in early autumn the garden can be made to glow with a richer color than at any other season. But as the season closes there comes a time when all the landscape is purpled with wild Asters or aflame with Golden-rod, when every strip of woodland and the shrubs in every thicket, and even the weeds of the fields and waysides, glow with colors with which no garden can hope to compete. Then at last comes a day when many of us feel inclined to let our gardens go the natural way of all vegetation. Some efforts may be put forth to save a few of our tender plants from approaching frost, and in this way our sympathies may be stirred to a renewal of our interest, but usually we let the garden alone to die as gracefully as it may. Alfred Austin, the British laureate, states the case with more poetry than is found in many of his verses, when he writes:

There is an orderly negligence, a well-thought out untidiness, a secret of careless grace about autumnal forms and colors which no other season can match. Even to the garden proper, autumn adds such wonderful touches of happy accident that when it really comes a wise man leaves his garden alone and allows it to fade and wane and slowly and pathetically pass away without any effort to hinder or conceal the decay. Indeed, it would be worth while having a cultivated garden if only to see what autumn does with it.

It is November, however, before this time comes hereabout, and, as a matter of fact, one who really knows his garden sees growth and beauty until the ground is frozen hard, and, indeed, all winter long whenever the surface is bare, on a sunshiny day he will be watching the movements of those sturdy things which are getting ready to flower as soon as the days begin to lengthen. Certainly there is no season when material for giving true beauty to our grounds is more abundant than that which is available just now; and yet, it must be admitted, we do not make as much of our gardens at this season as we might. One reason may be that the best of the herbaceous plants which flower at this season require to be cared for all summer long. The early spring-flowering bulbs are planted in autumn and left alone all winter, and then they bloom without exacting any more attention; while, if we are to have flowering Chrysanthemums, or Cosmos, or Japanese Anemones and many more, we must keep them watered and hoed and staked and tied and sprayed for months. But certainly the results of such care will repay all the outlay, and the notes of Mr. Watson, Mr. Gerard and Mr. Hatfield in this number invite attention to the wonderful display which we may have if we are willing to take the pains.

Already the leaves of some of the shrubs and trees have begun to change, and if we have studied the subject we know that individual trees have special beauties in this direction which can be propagated, and we can make brilliant pictures now and for the weeks to come by harmoniously grouping those which have striking features. There is no need to speak of our Oaks and Maples and Tupelos and Liquidambers, nor of the smaller trees like Sassafras and Sorrel and Dogwood, or of the shrubs like our Yellow Root with its scarlet and orange, our high Blueberries and other Vacciniums, Leucothoës, Viburnums, Sumachs, Rhododendron Vaseyi and many of the Asiatic Spiræas, all of which have been described over and over again in these columns; and then there are the shrubs like the Hollies and Winter Berries, Thorns, Barberries, Viburnums, Cornels, Honeysuckles, Roses, Climbing Bitter Sweet and its Asiatic relative Celastrus articulata and many more, whose fruits are as bright as their blossoms. With proper care it is plainly possible to make selections from these trees and shrubs and group them so as to form masses of richly colored fruit and foliage in autumn. Of flowering plants in early autumn, we have our native Lobelias, Hibiscus and Asclepias, with at least a dozen Sunflowers, the Silphiums, Boltonias, Rudbeckias and Asters, Vernonias, and with them the great Groundsel (Senecio pulcher), the Mountain Fleece, Trycirtus, the autumn-flowering Monkshood, the pyramidal Bellflower, and climbers like the late Clematises. Mr. Gerard and Mr. Watson call attention to the singular charm of certain autumn-flowering bulbous plants. We may add that many biennials and perennials like Delphiniums, Gaillardias, Pentstemons and Iceland Poppies, if the seeds are sown in January and planted out in spring, can be had to bloom in autumn.

Naturally, these autumn-flowering plants are taller than those of spring, having had all the summer to grow in. Some make great masses from six to ten feet high and of corresponding girth. No one, for example, who has not seen a well-grown Boltonia can appreciate how effective a full-sized specimen becomes when set in rich deep soil and properly cared for. The spring garden, it is true, has all the charm of a new creation. The flowers have a delicacy and dainty grace which make them especially delightful in the wild weather which they brave, and our senses have not been sated with a long season of familiarity with all the treasures which the garden has had to display. They have no rivals, but gather an additional interest from the fact that they are a promise of what is to come. Still, our autumn flowers have a stateliness which is theirs alone. They harmonize with the rich, mature beauty of

the landscape. They come also to grace the most delightful weather of our northern year. After our uncertain and often disagreeable spring and the oppressive heats of summer these bracing days make life out of-doors a constant delight, and one can imagine no more favorable conditions for enjoying a garden than those furnished by an American autumn.

The Alpinum in the Botanic Garden of Tübingen.

DURING a brief period of work in the Botanic Institute at Tübingen during the summer, by the courtesy of the director, Professor Vöchting, I had ample opportunity to examine the construction and become familiar with the details of management of what, in many features, is the most remarkable alpinum in the world. The Botanic Garden, in which it is situated, lies in the north-eastern quarter of the small university town of Tübingen, on both banks of the Ammer, a small stream which empties into the Neckar, a short distance away. The garden has an elevation of about 1,000 feet, and near it are many hills covered with forests of Pine, which rise 250 to 300 feet above it, while to the southward, twenty miles away, the Swabian Alps reach a height of 2,500 feet, in consequence of which the night temperature falls far below that of the day. A latitude of 48° 30′ north, a low winter temperature of — thirty degrees, Centigrade, a summer limit of twenty-five to twenty-eight degrees, Centigrade, help to make a climate which resembles that of southern Michigan in many respects.

The alpinum is laid out in the north-western part of the garden, on a rectangular plot of ground 190 feet in length and nine feet in width, near a stone wall seven feet high and parallel to its length. On this plot are piled the rocks and soil necessary for the culture of the plants, in an uneven ridge, which in one place is six feet in height. The materials used were principally the native stalactitic limestone and gravelly soil, and granite from the Black Forest forty miles distant. The limestone is peculiarly suitable for lower alpine plants and lithophytes, furnishing as it does innumerable cavities for the reception of soil and secure foot-hold for plants which cling directly to the rock. It has been found that the species from the higher European Alps refused to grow on such rock, and hence the granite was procured for the construction of the section devoted to this group. The entire structure is in many respects an admirable imitation of an east and west mountain ridge. The northern side affords many shaded crevices, and more or less shade to the whole is given by a number of small trees near by.

The most difficult problems which have confronted the gardener in the construction and management of the alpinum have been those connected with the water-supply. The water content of such rocky soils is, of course, extremely small and needs almost constant replenishment. In nature this is done by the water from the melting snows above. Here it has been accomplished by a system of branching pipes with many openings below and above the surface, and a flow is allowed during the greater part of the day. The drainage is carried away by cement conduits, and in one place forms an alpine lake eight feet in length and five feet in width, which furnishes in its waters and on the overhanging cliffs admirable conditions for a very rich flora. Near the lake are growing several specimens of Edelweiss, which here becomes somewhat longer-stemmed than on its native cliffs, or in the alpine gardens where it is cultivated to satisfy the thirst of the tourist for mementos of "hazardous" ascents.

Many of the alpine plants are quite intolerant of lime salts and grow best on the granite rocks, but the water-supply used here is taken directly from the city system and is very richly charged with these salts, and, as a consequence, the culture of some of the plants of the higher slopes is impossible. This difficulty might be overcome at some cost by a system of tanks for the storage of rain-water, which would furnish exactly the natural conditions for a large number of species.

It is somewhat surprising to learn that on this area of about 2,000 square feet more than 1,200 species are successfully cultivated, almost all of which are perennials. In some places three, and even four, kinds are grown on a square foot of actual surface—a striking example of a form of intensive cultivation. It must not be supposed, however, that none but alpine species are grown. A glance at the list given below will show that many are at home far southward in the temperate zone. As a matter of fact the alpinum offers a wider range of conditions than any other method of cultivation, and in some form similar to that described might offer suitable conditions of growth for species fairly representative of the flora of America north of Texas, exclusive of trees.

The following list is copied at random from the labels, and comprises many rare species. In some instances a species will be found growing, properly labeled, however, outside of the section devoted to its habitat. Very naturally the section devoted to the European Alps is richest in forms growing at great elevations, as at present the opportunities for European gardens to procure living specimens from the higher American regions are somewhat limited.

The following are the names of some plants grown in the different sections of the alpinum:

North America.—Sedum stenopetalum, Draba incana, D. borealis, D. rupestris, Geum triflorum, Saxifraga cuneifolia, S. Pennsylvanica, S. bronchialis, S. stelleriana, Heuchera pubescens, H. sanguinea, Potentilla villosa, Cypripedium montanum, C. arietinum, C. pubescens, C. candidum, C. spectabile, C. acaule, Phlox nivalis, Œnothera pumila, Dicentra Canadensis.

Asia: Himalayas.—Sedum Kamschaticum, S. Asiaticum, Primula auriculata, P. Japonica, P. denticulata, P. erosa, Aster alpinus, var. Himalayensis, Androsace sarmentosa, A. lanuginosa, Gentiana Thibetica, G. septemifolia, Rehmannia Chinensis, Leontodon Himalayensis, Hepatica Valdensis, Artemisia stellerianum, Polygonum Brunnonis.

Europe: Alps.—Soldanella alpina, S. pusilla, S. minima, Gymnnadema odorotissima, Sempervirens crassicaulis, Cystopteris alpinus, Achillea alpina, Ranunculus alpestris, Erigeron neglectum, E. alpestris, Chrysanthemum alpinum, Pinus pumila, P. cembra, Saxifraga aretiodes, S. densa, Campanula thyrsoides, Mulgedium alpinum.

Philadelphia, Pa. *D. T. MacDougal.*

The Sand Dunes of Northern Indiana and their Flora.—II.

ONE of the first plants to appear on the higher dunes is the Bug seed, Corispermum hyssopifolium, an annual, somewhat succulent, bearing a thin, flat, winged seed, which is readily moved about by the wind. Its low stature and sparse narrow leaves catch but little of the wind, so that it is easily established. In more favorable localities it has a dense round head, and when torn from the ground in autumn becomes a Tumble-weed, which helps still further to disseminate it. The first of the Grasses to start, and among the earliest plants to gain a footing, are Calamagrostis longifolia, Panicum virgatum and Ammophila arundinacea, the Sea-sand Reed. The last is more common at lower levels among the beach-sands, but it comes up the sides of the higher dunes near the shore, and is found upon their tops. Grasses which come in later are Andropogon scoparius, A. fureatus, and the nearly allied Chrysopogon nutans, always a welcome sight, with its graceful panicles of russet silky spikes. Elymus Canadensis, especially the variety glaucifolia, frequently grows with the Calamagrostis and the Sea-sand Reed, and shows very large curving or nodding spikes of pale green. To these Grasses will be added subsequently species of Sporobolus, and in open but more sheltered places in the woods the small annual, Festuca tenella, thickly covering the ground in spring and early summer with a dense growth of low wiry stems. Common also are two closely related and pretty species, Eatonia obtusata and Kœleria cristata. Very interesting, from the behavior of its fruit, is the Triple-awned Grass, Aristida tuberculosa, its awns conveniently arranged to anchor the seed and force it into the sand as

they change hygroscopically. Quite similar in the action of its fruit is the Porcupine Grass, Stipa spartea, with a sharp, spear-like seed and long twisted awn, which, like a lever, gains some vantage-point to push against, and, as it twists and turns, crowds the sharp-pointed, barbed seed into the ground.

The most abundant trees are the Black Oak, the White Pine and the Banksian Pine. Together they constitute nine-tenths of the arboreous growth on the higher hills. The White Pine, being subject to the strong winds, develops a short, stout trunk, sometimes reaching a diameter of two and a half feet. The branches come low down and form an oblong or roundish top. In places where they are most crowded or better sheltered they make longer trunks, but these are usually small and the trees of comparatively low stature. The Banksian Pine is scattered about everywhere, but does not form the dense groves and nearly exclusive growth by which it characterizes some of the lower sand ridges or more level areas. The Black Oak, Quercus velutina, is almost the sole occupant of many places, for it more easily survives the fires which sweep over the forest-land and destroy the resinous Pines. If the trunk is killed or the trees are cut down for wood, the younger and more vigorous soon form a coppice and reclothe the ground. The acorns, easily buried in the sand, often sprout abundantly in a wettish season. The White Oak, Q. alba, is next to it in frequency, and forms a low, stout tree. The Bur Oak is seen in limited numbers, and occasionally the Red Oak. The Scarlet Oak may also be present, but I do not find satisfactory evidence of it, though it is naturally looked for on such sandy land. But the representatives of the Black Oak group of Oaks in this vicinity are so exceedingly variable, and approach each other by so many gradations of character, that it would be rash to pronounce definitely upon such a point.

The common Basswood seems quite out of place with such an environment. When present it is generally established on sheltered slopes or in narrow ravine-like depressions left among the hills, but I have seen it forming clumps of bushes in the midst of the Sea-sand Reed and Bailey's Cornel on top of a high dune, which the wind was slowly removing. The Cottonwood, the most common tree, and the first to establish itself on the lower sand reaches close by the beach, also gains a footing on the hills. Populus tremuloides and P. grandidentata likewise have representatives. The Buttonwood is occasionally seen, very queerly placed, with its pale trunk rising up from the midst of a clump of Juniper, and with the Gray Pine for a near neighbor. The Red Cedar must be added to the coniferous flora, small, but usually picturesque trees when, scarred and torn by the wind, they cling to the topmost edges of a disappearing dune, sturdily holding the outposts.

Among small trees we note Cornus florida and the Sassafras, the latter more frequently a shrub. Either as a diminutive tree or shrub the Choke-cherry is quite abundant, very beautiful in spring when mantled in white blossoms, and equally engaging in summer when loaded with clusters of dark crimson drupes, for it fruits very copiously on these sand hills. Sometimes the Juneberry, Amelanchier Canadensis, grows with it, adding its white blossoms in spring and red or purple fruit in early summer, a tree or shrub of similar habit.

Chicago, Ill. *E. J. Hill.*

Nelumbo lutea, the Water Chinquapin.

THE illustration on page 375 shows a colony of the American Nelumbo, or Water Chinquapin, which has been naturalized in a pond in the town of Lynnfield, Massachusetts, some fourteen miles from Boston, and shows what unassisted nature can do in the way of aquatic gardening. It seems that the colony was started some twenty years since by a Mr. Silver, who was visiting a friend living on the shore of the lake. Plants of both the Nelumbo nucifera (speciosa) and N. lutea were used, but the exotic plant soon disappeared. It did not even survive the first hard winter, very likely because it had been planted too close to the shore.

The group of Nelumbo now extends along the shore of the lake some two hundred and fifty feet and into the lake some one hundred feet, and is increasing very rapidly. The plants do not bloom with regularity every year, and such blooms as do appear are rarely allowed to perfect themselves, owing to the ravages of bicycle-riders and other visitors.

Although this plant is not as interesting as the so-called Egyptian Lotus in some respects, yet in many ways it is a most desirable aquatic for ornamental use, and its broad handsome foliage is particularly effective, with its rich bluish tinge of color contrasting so well with the light green under side when disturbed by the breeze. Established clumps are a study for their foliage alone. The wide floating leaves completely cover the surface of the water, serving to emphasize the stately effect of those that are held above the surface by their longer and stouter stems, while the curious unfolding of the young foliage and the opening buds on their sturdy stalks all unite to give an effect not to be found in any other native American plant. The flower-buds stand eighteen to thirty inches above the surface of the pond on sturdy clean stems, and quickly changing from a light green to a rich clear yellow when unfolded. The fully extended flowers are from seven to ten inches across, making a rich contrast with the light bluish green, velvety foliage. No native flower excels them in size except those of the Magnolia macrophylla.

No question can be entertained of the hardiness of the plant, and it should prove of high value in ornamental aquatic planting. It ought to thrive wherever the Egyptian Lotus will, and the yellow flowers mingled with the pink ones of the Sacred Bean, as the Asiatic species is often called, would make a pleasing picture. The newer Japanese forms, such as the pure white Shiroman, would lend additional charm to such a group.

This group seems to have been overlooked by most of the local botanists, and has been comparatively unknown up to the present time except to a few, and this furnishes a reason, perhaps, why the clump has increased to its present proportions, as otherwise it would probably have been sadly torn and depleted before this.

Reading, Mass. *J. Woodward Manning.*

[We have already given an illustration of a pond in southern Illinois covered with our native Nelumbo (see vol. iv., p. 556), and we give this second picture for the purpose of calling more direct attention to this neglected plant. It is by no means rare, being common all through the Mississippi basin and on the border of the Great Lakes, although it is comparatively rare in the east, where it was probably introduced by the Indians, who are said to have used it as an article of food. So far as we know, the only other locality where it is known to exist in Massachusetts is at Osterville, where it was found a few years ago by Professor Farlow. The fact that it is hardy so far to the north and east, and that it becomes easily naturalized, ought to encourage planters to make more use of it, and to stimulate hybridizers to experiment with it as the parent of new varieties. Mr. William Tricker writes that it seems to be more difficult to establish than the Asiatic species, although he has seen it in splendid condition and growing more freely than its relative. An amateur aquatic gardener, near Little Falls, New Jersey, planted some seed in the regular way and set them later with other aquatics in a pond whose bottom was hard clay. The plants grew rapidly and bore freely the second year, their splendid flowers, with shell-shaped petals, of as pure a yellow as those of Nymphæa sulphurea. They ripened tubers not extra-large, but solid and sound, and these started well when planted out the next spring. Perhaps the soil may be an important factor in success with these plants, since Nymphæas, Nelumbiums and most other aquatics flourish best when the soil is rather stiff. Upon the whole, there seems to be no good

reason why this plant should not be much more generally used, and, no doubt, it would be if it were as well known as the Egyptian species.—Ed.]

Foreign Correspondence.

Autumn-flowering Hardy Bulbous Plants.

THE value of bulbous plants for producing beautiful effects in out-of-door gardens in the months of spring and early summer is generally recognized. I propose to call attention here to a considerable number of bulbous plants which may be most effectively used in what may be termed autumn gardening. During the months of August and September it is possible to have quite a grand display of flowers from bulbous plants of easy cultivation, and one can only account for their scant use at present in gardens generally by believing that they are either unknown or that they are crowded out by commoner plants. Gardening is apt to become stereotyped, the same plants being used for the same places and put out at the same time, year after year, without any regard for change and the pleasure that fresh features in the garden rarely fail to bring.

Probably every one of the plants mentioned below is cultivated in most good gardens, but I doubt if many of them are grown in such quantities as to produce a telling effect, and I know that in some gardens they are coddled in pots or stuck in out-of-the-way corners, where their charms are practically buried. The first time I saw Crinum Moorei filling a huge bed in the garden of Sir Trevor Lawrence, at Burford Bridge, now some fifteen years ago, I was astonished by the vigor of the plants and delighted by the hundreds of magnificent heads of large flowers in their full glory in the last week in August. Previously I had only known this Crinum as a pot-plant. Twenty years ago we grew Lilium auratum in pots for the conservatory, and in many gardens this plant is still known only as a greenhouse plant. Any one who has seen the big beds of it in Mr. Wilson's garden, at Weybridge, or in the Royal Gardens, Kew, knows the difference between this Lily when grown in the conservatory and the many-stemmed tall clumps crowded with flowers that are possible when the bulbs are grown in beds along with Rhododendrons or such like shrubs. In Mr. Robinson's garden, at Gravetye, I lately saw a large bed of Ghent Azaleas enveloped in the flame-like colors of Crocosmias, which had taken entire possession of the space between the Azaleas, and was almost a weed in Mr. Robinson's eyes. Schizostylis coccinea is generally grown in small quantities in pots, but in a few gardens, where its merits as a late autumn flowering plant for the open border are recognized, it is grown in large breadths and produces in abundance its erect spikes of bright crimson flowers. Even slight frosts do not interfere with its blooming, and I have seen a rich display of flowers in the open air in December.

To obtain such effects as are here described there must, however, be no "skimping"; large quantities of the bulbs must be planted, and planted with judgment. I have never seen the Belladonna flower when planted at a greater distance than a foot from a south warm wall, except in the warmer parts of Cornwall. The Jacobean Lily is equally shy of flowering if not humored by the supply of heat at its toes. This plant, however, blooms in spring. The same is true of Lycoris squamigera (Amaryllis Hallii), which we could not flower in pots at Kew, but which has flowered freely this year in a narrow border under the south wall of a tropical fernery.

The following plants are most effective at Kew in the open air in August and September:

Amaryllis Belladonna.—Planted in narrow borders against the south walls of several greenhouses in a deep loamy soil. In winter they are mulched with light, well-decayed stable-manure. This affords protection to the leaves which push into growth in early spring and are apt to get nipped by frost. The leaves all wither in July and the spikes are pushed up in August or September, the bulbs nearest to the wall always leading the way. They should be planted about a foot below the surface (base of bulbs). About every fourth year they require to be lifted, the bulbs separated and replanted six inches apart. The variety Blanda is three weeks or a month earlier than the type. The Kew variety is characterized by stout scapes, two feet or more high, many-flowered umbels, and the upper half of the segments colored rich rose-crimson.

Lycoris squamigera.—From what I have seen of this plant it is likely to become valuable in the same way as the Belladonna Lily, for it thrives under the same treatment and flowers at about the same time of year. [See pp. 323 and 347 of this volume.—Ed.]

Crinums.—The three hardy Crinums are C. Moorei, C. longifolium (Capense) and the hybrid C. Powelli. Of the last named there are three forms—the type, which has rose-tinted flowers; alba, which is pure white, and rosea, which might appropriately be altered to purpurea, the color of the flowers being almost crimson. I know no bulbous plants of greater merit than these hardy Crinums. At Kew we have large groups of them in beds under the lee of the great Palm house, and they are now beautiful with their tall-stalked umbels of large elegant bells. They increase rapidly by means of offsets, one bulb of the white Powelli procured four years ago having increased to fifty strong-flowering bulbs. These plants require deep, well-drained soil and a liberal allowance of moisture in the growing season. They are hardy away from a wall, good masses of them being now in flower in the Bamboo garden.

Eucomis.—When grown in pots these plants are not considered attractive, but when planted out in rich soil in a position sheltered from wind they produce grand foliage and tall spikes of flowers two or three feet high, like glorified Hyacinths. Beds of them at Kew are now very attractive. They require the shelter of a wall, otherwise they should be protected with a cone of ashes in winter. The species grown in the open air at Kew are E. undulata, E. punctata, E. Zambesiaca and E. regia. They are all south African.

Tuberoses.—A bed under the wall of the Palm house was planted last May with these plants, and they are now almost every one bearing a stout spike of flowers. The exceptional heat of the summer may account for this success; certainly I have never seen the Tuberose flower like this in the open air, but I ought to add I have never before seen it tried.

Schizostylis coccinea.—This south African Irid is quite hardy, and it possesses the distinct merit of flowering late in the year. It ought to be planted on a south border in a light, rich soil and watered during dry weather. We find it a good plan to lift the plants every spring and replant them.

Crocosmias.—I have already mentioned the rich display made by these plants when used in large masses. There are now many varieties of them, thanks to the skill of Messrs. Lemoine, of Nancy. They grow freely in light soil and take care of themselves, although to keep them vigorous they require to be lifted and replanted every three or four years. The giant of the lot is C. aurea imperialis, for which we are indebted to Herr Max Leichtlin, of Baden. These plants are most valuable in the flower garden.

Liliums.—The best of these for autumn effects are Auratum, Speciosum and Henryi. These are now magnificent at Kew, Auratum among the Rhododendrons, hundreds, I might almost say thousands of them, tall, stately, their great flowers shining in the sun like enormous stars and exhaling an odor which is most enjoyable in the open air. Speciosum is not so tall or so stately, but it ranks next to Auratum as a free-flowering effective autumn Lily. Henryi has the exceptional quality of extending its flowering season over two or three months; at any rate, it has been in flower at Kew since early in July, and it will be in flower in September—a grand Lily, easily accommodated, stately,

distinct and handsome, all virtues and no vices, so far as I know, and I handled the first two or three tiny bulbs of it that reached this country from China. L. Formosanum is flowering in the open now, and it would deserve to rank with the best of the genus were it not for its bad habit of generally dying after flowering.

ZEPHYRANTHES CANDIDA.—This is one of the most delightful little plants in the garden. It grows freely as a substitute for Box edging; indeed, a long border now edged with it used to be edged with Box, and the Zephyranthes was planted a few inches inside the box and in front of Belladonna Lilies. Here it grew and multiplied rapidly, eventually killing the Box which it has supplanted. The edging is now about a foot wide, and consists of a dense array of dark green rush-like leaves six or eight inches long, which in August and September are accompanied by thousands of pure white star-like flowers three inches across. The plant is not injured by frost and it transplants as easily as Chives.

TIGRIDIAS.—All the Tigridias of the Pavonia or Grandiflora section are excellent plants for beds to flower in August and September. They are beautiful with us now, white, cream, yellow, orange and variegated varieties, which have names, but no two dealers' names agree, and if one orders white he will probably get orange or yellow. Still, they are all beautiful, and mixed beds of them are very showy at this time of year. We lift them early in winter and store them in dry sand, replanting in May.

TULBAGHIA ALLIACEA and violacea are two elegant little Cape plants with narrow leaves and tall slender scapes of lavender or rose-purple flowers. They flower freely during summer and autumn, and are perfectly happy in a sunny border out-of-doors. I do not know if they will bear severe frost, but intend to try them this year. A third species, Natalensis, has yellowish, fragrant flowers.

COLCHICUMS.—No picture in autumn surpasses an English meadow studded all over with the pale purple Crocus-like flowers of the Meadow Saffron. A similar effect may be produced in the garden by planting the bulbs thickly in grass on sloping banks near water, or where a fair supply of moisture is available. They are employed in this way about the lake at Kew, and also in the wild garden. C. speciosum, C. Parkinsoni and C. Sibthorpii are not sufficiently plentiful to be used in this way, but it would pay any bulb grower to work up a large stock of these three large-flowered handsome species for planting on a large scale.

CROCUSES.—The species of Crocus which flower in the autumn have not yet come to be used in the garden as their congeners, the spring-flowering species, are, but some of them are certain to become popular for this purpose when once they are procurable in quantity. C. nudiflorus, the autumn Crocus, a native of English meadows, is a perfect plant for the purpose.

London. *W. Watson.*

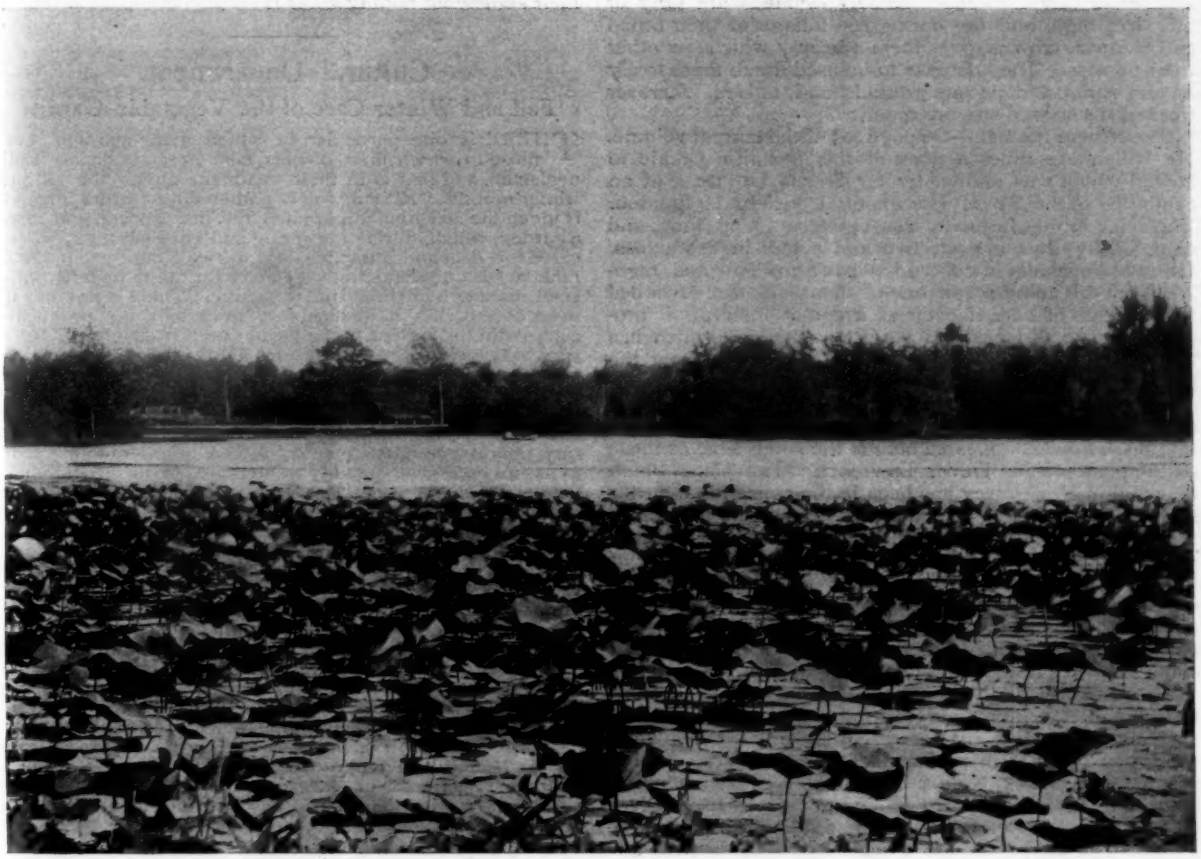

Fig. 50.—Nelumbo lutea, the Water Chinquapin, in a Massachusetts pond.—See page 373.

Plant Notes.

MORUS RUBRA.—Our native Red Mulberry is larger and more handsome than any other species of the genus which grows in a temperate climate. An old tree growing on the estate of Mr. P. J. Berckmans, in Augusta, Georgia, some years ago had a diameter of seven feet, three feet above the ground, but this was of exceptional size. The stout trunk rarely exceeds three or four feet through, and the tree

reaches a height of sixty or seventy feet. The head is round-topped and shapely; the ample leaves are yellowish green as they unfold, and at maturity they are a dark bluish green above and pale pubescent below, turning in autumn to bright yellow and falling early. The flowers are insignificant and borne in unisexual catkin-like clusters, and the fruit, as is well known, resembles a small blackberry and ripens here early in July. Not much attention has been given to selecting trees for the purpose of securing fruit in greater abundance or of better quality, but even in its natural state the fruit is by no means to be despised. We invite attention to this Mulberry now, however, as one of our most desirable native ornamental trees. It is hardy, and when it is placed in rich soil grows rapidly and gives a dense shade. This week our attention has been called to several of these trees which are growing in the churchyards and private grounds of New York and Jersey City. Some of these specimens are forty or fifty feet high, and the dark green foliage of their broad and compact crowns gives them a beauty which few other trees possess. They deserve to be used much more freely in our parks and private grounds, and, indeed, wherever trees of the second size are required.

Renanthera Storiei.—On page 284 of the current volume, Mr. Watson describes a plant of this beautiful Orchid in flower, which was shown by Sir Trevor Lawrence at an exhibition of the Royal Horticultural Society in London. The spike in this instance was eighteen inches long, and carried fifty flowers each two and a half inches across. Hitherto the plants in cultivation have not flowered regularly, but the possessor of one of them will feel rewarded for his years of care if even at irregular intervals it produces a spike as large and perfect as the one which has been sent to this office by Mr. A. Herrington, from the gardens of H. McK. Twombley, Esq., in Madison, New Jersey. Unfortunately, the photograph is not sufficiently distinct for the best reproduction. We may say, however, that these flowers appeared here at the same time as those on the plant of Sir Trevor Lawrence. The plant which flowered in New Jersey has been in the collection there for several years without showing any disposition to bloom. Mr. Herrington writes that it had become lanky and consisted of one stem four and a half feet in height, devoid of leaves on the lower half, but well furnished with aerial roots. As an experiment, early this year it was beheaded eighteen inches above the top of the pot and the severed portion was repotted. Doubtless this drastic treatment had some influence in inducing the formation of a flower-spike, as one was observed within three months after the decapitation, and this ultimately developed into a magnificent specimen of its kind. It bore in all seventy-three flowers, every one opening to perfection. The perfecting of this number of flowers proved a considerable strain upon the plant in its semi-established condition, causing it to shrivel perceptibly, so the spike was cut, and it kept fresh in water a number of days. In the whole Orchid tribe there are few so richly and highly colored as this Renanthera, its flowers being uniformly of a bright crimson, varied with transverse bands of a deep dark crimson, velvet-like in richness and texture. The disposition of the flower-spike and its habit of branching are noticeable for almost geometric regularity. The main branch of the flower-raceme grew out at right angles with the stem of the plant, and throughout its entire length of nearly two feet maintained an even horizontal position. Its four lateral branches, two on either side, grew at right angles with the main branch, keeping the same regular rigid poise. The decapitation of the plant, while evidently hastening the production of flowers, proved a double gain in giving another plant, and a latent bud has since started into growth toward the tip of the old leafless stem which was left in the pot in which the plant originally grew.

The Double Golden Rudbeckia.—This is the garden name of one of the latest additions to the list of our attractive hardy perennials. Mr. Gerard reports that a second season's test proves it to be a plant likely to become generally popular, though we are supplied with almost a surplus of yellow flowers in midsummer and later, among which the single Rudbeckias, or Black-eyed Susans, have always been favorites. The plant introduced as the double Rudbeckia has a distinct habit, being tall, growing three to four feet, with unbranching stems and pinnate or palmately parted smooth leaves. The six or more flowers which are borne from each stem on long peduncles are nearly three inches in diameter and pretty double, showing no centre, in color a golden-yellow, but not quite a perfectly satisfactory clear shade. They may be rated with the double Sunflowers, Zinnias, etc., useful for bold effects in the garden or decoration. The plant is probably a sport or variety of R. laciniata. Mr. Gerard suggests that the flowers resemble in form those of a Cactus Dahlia, but their somewhat muddy color is against them.

Cultural Department.

Fall and Winter Care of the Vegetable Garden.

THERE is one particular in which many gardens, even those in which their owners take great pride, are sadly neglected, and that is in their treatment during the fall and winter months. After a crop is gathered no further attention is given the soil until it is wanted the next spring, and many a garden, which, during the spring and early summer, is well cared for, neat and attractive, is a waste of bare ground or of rank weeds and scattering vegetables for the remainder of the year, making it anything but attractive. There is not only no need of this, but it lessens very materially the productive capacity of the garden. The farmer finds it absolutely necessary to occasionally seed down his fields. Why? So that the soil may be lightened, loosened and filled with fine roots, giving it what Professor Bailey aptly calls "fibre," but many of our gardens have been in cultivation for years, utterly regardless of conserving this quality which the farmer finds so necessary, and in consequence we are forced, in order to get a crop, to use an excessive quantity of manure, to the detriment of the quality of our vegetables. This deterioration of the soil can be prevented and our gardens be made attractive, or at least not repulsive, through the whole year by the use of soiling crops. As soon as a crop of Lettuce, Radish, Peas, Beans or Corn is past, let the ground be immediately cleaned, cultivated, and sown with Crimson Clover, Rape, Peas, Rye, Turnip or some other crop. It may be that from the want of moisture the seed will not start immediately, but if not the spot will not look untidy, and after the first rain the plants will soon cover the ground, shading it from the injurious heating by the sun, filling the soil with roots, catching and holding fertility which otherwise would be lost, and, by no means least, making a spot which would otherwise be unattractive, beautiful. We know of one case where the growing Clover was so beautiful that the owner could not bear to spade it under and sacrificed one season's crop of vegetables to its beauty. We think there is no way in which manure can be made so available for the next season's crop as by applying it to such a soiling crop in the fall or early spring. If there is much trouble from insects we can do much to rid ourselves of them by spading or plowing the crop under, the day before the final freeze-up in the fall, thus breaking up their winter quarters and exposing them to frost and ice; but we think the greatest benefit to the soil would result from leaving the crop until a few days before the ground is wanted in the spring.

Detroit, Mich. *Will. W. Tracy.*

Small Fruits.

DURING the month of September preparations should commence for another season, and upon the treatment now given the supply of fruit will largely depend. The old canes of Blackberries and Raspberries should be cut away and a requisite number of the strongest of the young ones tied to the wires or stakes, the weaker ones being removed to concentrate the vigor of the plants and allow freedom of light and air to those that are left.

If left untied the young canes are sure to be more or less broken or injured by storms. Frequent hoeings will be required to keep down weeds, and all suckers should be dug up as they make their appearance, unless the making of a fresh

plantation is contemplated, when the strongest may be left until the leaves have fallen, after which they can be lifted and planted closely together in what is commonly called a nursery-bed, where they can be conveniently protected. The planting in their permanent quarters had better be delayed until spring. We find that fall planting usually results in a good many losses.

Some approve of cutting or pinching back the young canes while in a green state, but our experience is that more harm than good results from this practice, as it has a tendency to excite the buds into growth, which ought to be kept dormant until spring. We have seen the heading back done after the leaves have fallen in November, but nothing is gained, unless it is necessary for saving time in spring. We find that the points of the canes are usually cut back more or less by frosts during winter, and it is advisable to leave the heading-back process until the severest of the weather is over, but it should always be done before the sap has begun to flow. In this section it is unnecessary to cover the canes during winter, but a good mulching with stable litter will be found beneficial. This is better applied after the ground is frozen over just hard enough to bear a man's weight.

The principal work in the old Strawberry-beds at this season is keeping them well hoed and clear of weeds and removing all runners as they appear. Fresh plantations may still be made, though if this has been done in August so much the better, as they then have the advantage of a good start before the winter comes on.

It is most important, especially in late plantings, to have the ground well firmed along the lines where the plants are to be set out. We take it for granted that the ground has been well tilled, and is, therefore, loose, and unless it is well firmed around them and the plants set well down they would be left too high after the soil has settled, and therefore subject to be thrown out by frost; not only this, but the Strawberry-plant always inclines to rise, and the further it is kept down at first the better, so long as the crowns can be kept clear. Much has been said about the expediency or otherwise of mulching Strawberries and of the different materials to be used. They are undoubtedly benefited by a mulching, and we have found nothing better for the purpose than good long stable litter. The covering over the plants themselves should be very light, but heavier between the rows, the object not being so much to protect the plants themselves, but to prevent alternate freezing and thawing of the ground. It should be applied as recommended for the Raspberries after the ground has frozen over.

Tarrytown, N. Y. *William Scott.*

Late-flowering Shrubs.

OWING to the frequent rains since midsummer the late-flowering shrubs are in finer condition here than they have been for several years past. They made good growth in the early part of the season, and the continued supply of moisture has enabled them to develop their flowers so that now there is quite a profusion of bloom in the shrubberies where, in ordinary seasons, there is little else to be seen than parched foliage. The large-flowered Hydrangea paniculata is usually a sorrowful object with us unless watered several times a week during dry spells. Some of the plants which were put out here, about the time of their original introduction from Japan, have grown to a height of about fifteen feet; a few of them have stems three or four feet high and several inches in diameter.

Under the name of Vitex Agnus-castus there are several distinct species cultivated, none of them approaching the true species in value as a late-blooming shrub. There are at least three varieties differing only from each other in the color of the flowers, which are purple, pink or white. Cuttings of them root freely from now on under glass, or they can be raised from seed which ripens in abundance. The Crape Myrtle, Lagerstrœmia indica, from the fact of its being unreliably hardy in the northern states, is comparatively little known north of here. A great deal may be accomplished with it, however, by giving it a little protection in the winter months. Old plants which have been thoroughly established in favorable seasons take no harm here when the thermometer is below zero, but one and two year old plants get killed to the ground when the mercury falls so low. But even when killed to the ground year after year, they make rapid growth the ensuing summer and flower after attaining a height of about three feet, The flowers are bright pink, and there are forms with purple and pure white flowers. Old plants set seed abundantly, and if sown early will flower the following summer.

Lespedeza Sieboldii, often called Desmodium penduliflorum, is a true herbaceous plant, although sometimes classed with shrubs; it gets to be about six feet high and forms a symmetrical plant. This, the only species of the genus grown extensively on account of its extremely ornamental character, is now coming into bloom and will continue till frost. It is a very reliable plant, especially for soils which get dust-dry in summer. There are two forms, rose and white flowered; it is propagated by division early in the season, or from cuttings taken any time after the wood is ripe.

For our climate, both north and south, few shrubs behave better than the old-fashioned Hibiscus Syriacus, but for some reason we seldom see in common cultivation any but the varieties which the old books tell us were in existence a hundred years ago. During the months of August and September these plants produce their large flowers in great profusion. Some of the best kinds are the following: Leopoldii, blush color shaded with rose, very double on young vigorous plants, the flowers borne on the ends of the long shoots making it a valuable plant for cutting; Totus-albus, the best, single white, one of the most floriferous—it comes true from seed, which even the small plants ripen freely; Comte de Cainaut, very double, blush; Camelliæflora, white, slightly tinged with pink, very dark centre; Rubra plena, the best of the double reds.

Some seasons Clerodendron viscosum is a mass of bloom here; during others it shows only scattered flowers. Where it is hardy it is a good plant for dry soils, as it roots very deeply. In the southern states it increases so fast from underground growths that it has become a nuisance. It is not reliably hardy north of Washington.

Abelia floribunda commences to bloom on the current season's wood early in summer and continues in flower later than any other shrub; last season we picked some flowers from it a few weeks before Christmas. In mild winters it is evergreen, like some of the Ligustrums, but during severe seasons the leaves fall off. The plants, however, are not injured in the least; some immense specimens have stood in exposed places here for the past forty years. It is a native of Mexico and is propagated by cuttings made from the ends of the growing shoots in the fall.

Caryopteris mastacanthus is a member of the Verbena family, which has been called a blue Spiræa. It is just as valuable as if it were a Spiræa, and probably more so, because it flowers when its flowers are most wanted. It is said to grow only two feet high, but on some plants which did not get killed to the ground last winter the growths are four feet long and covered with buds. It is said to be quite hardy in Massachusetts; if so, it should be in every collection, as it deserves all the good things that have been said of it.

Botanic Garden, Washington, D. C. *G. W. Oliver.*

An Autumn Garden.

OUR borders are for the most part filled with plants which bloom from spring until the end of July, and to be perpetuated in good health the plants must remain and ripen their growth. The deserted look of the borders toward the end of summer and in autumn is but poorly relieved by sparsely planted clumps of Phloxes, Asters, Sunflowers, Lilium tigrinum, Hemerocallis Thunbergi, Campanula ranunculoides and a limited number of plants which can be considered reliably hardy. By mid-autumn they are scanty indeed. It must be so, however, if the borders are planned for spring flowers alone, and it is scarcely satisfactory to say there is always "something" in bloom.

It has often occurred to me that we might have an autumn border—an autumn garden—if we wished, wherein all plants which are at their best at this season could be grouped together. There is plenty of variety to choose from. We might include some shrubs with bright-tinted foliage or handsome fruits, but it should be remembered that shrubs and herbaceous plants do not grow well together. The herbaceous border should not form part of the garden scene, but be situated rather out of the way, where the plants have a chance to grow in good air and sunshine, to be seen at close range only. In small-suburban gardens the case is different, where no broad effect is possible. While the autumn garden would not be at its best until late summer, it never would look untidy.

Autumn-flowering hardy border plants are mainly Composites, and the prevailing colors are shades of purple, as in the Asters, or yellow, as in the Sunflowers. For color-effect some annuals might be included, as Zinnias, Scabious, Verbenas, especially V. venosa and V. erinoides, Pentstemons, Antirrhinums, Nicotiana affinis, single Petunias, new Early Cosmos and Bleeding Heart, Amaranthus caudatus. Many beautiful tender perennials will be found serviceable in this

grouping. Dahlias, Cannas, Salvia splendens, Leonotis Leonurus, the Lion's Tail plant, with bold spikes of orange-scarlet flowers, and the lavender-flowered Caryopteris mastacanthus. Tender bulbous plants also might be included, such as Tritomas, Gladiolus and Montbretias. Anemone Japonica, which is locally hardy, but better treated as a tender plant, will be a valuable addition. Among reliably hardy plants, in addition to those already noted, are Pyrethrum uliginosum, with its large, handsome Daisy-like flowers, splendid for cutting; Aster Novæ-Angliæ, A. longifolius formosus and A. Shortii; Plumbago Larpentæ, Rudbeckia purpurea, R. Newmanni, Lilium lancifolium, Lobelia cardinalis, Vernonia Noveboracensis, Eupatorium purpureum, Chelone Lyoni, C. barbatus Torreyi, Funkia subcordata, Asclepias tuberosa and the best of the Golden-rods. Clematis paniculata and C. Pieroti are very ornamental when trained upon lopped cedar posts. Ornamental Grasses are also effective, and this list might be considerably extended.

Wellesley, Mass. *T. D. Hatfield.*

Some Good Autumn-flowering Plants.

A RECENT editorial in Garden and Forest called attention to what is only too well known to busy amateur gardeners—namely, the absence of long twilights in our country. It is especially at this season that rapidly shortening days forbid much garden work by a business man, and as the early morning finds all vegetation dripping from heavy dews it is small wonder that such aggressive enemies as Couch Grass, etc., make a strong effort for the possession of the soil. Fortunately, most of the plants of the season are also strong, as Phloxes, Sunflowers, Asters, Rudbeckias and the like, and capable of a vigorous dispute for the occupation of the ground, and these showy plants are apt to be most in evidence now in every garden. But there are other plants and flowers more interesting than these at this time, if less abundant and showy. Among the great family of large-flowering Amaryllids I do not recall any more beautiful in bloom than Crinum Moorei and its hybrid C. Powelli. C. Moorei is a Natal species with an ovoid bulb and a long neck, with spreading leaves two feet or more long. An umbel of six to ten flowers is supported by a thick, tall peduncle, and these are individually of large size, slightly hooded and drooping, and usually of the purest and most charming pink. They vary somewhat in color, there being forms with white flowers. This is an indispensable plant if one has cool-greenhouse facilities. The culture is of the simplest; it requires potting, and is apparently not fastidious as to soil. It is well to grow it along into a fair-sized tub with its offsets, of which it is prolific, until it makes a good specimen, as it will then be more effective in the garden when in flower. In the late fall it should be removed to a cool house and kept fairly dry till new leaves appear in midwinter, when it may have more moisture, the supply being increased on removal out-of-doors in the spring. C. Powelli, while resembling C. Moorei in flower, has a bulb with a shorter neck and drooping channeled leaves some four feet long. It is especially valuable for its hardiness. In a sheltered place here it is cut to the ground, but reappears in the spring, being only protected with a small mound of ashes or earth to throw off moisture.

Another charming flower is Acidanthera bicolor, which Mr. Endicott described, with a figure, in the first volume of Garden and Forest, page 484. This Irid has Gladiolus-like corms and leaves and numerous sweet-scented flowers on pendulous stems; they are white, with chocolate markings.

Some years ago I received from Monsieur Lemoine a collection of hybrid Montbretias, Aurea, Etoile de Feu, Phare, Bouquet Parfait and others. The labels were long since lost and the varieties grown together, for the first two named represented fairly well the whole collection. Etoile de Feu is especially fiery, and when well grown a most satisfactory variety. The plants seem to require high culture in good soil and much moisture, otherwise the leaves are apt to turn brown on the edges and the corms devote themselves to increase instead of flowers. My success with Montbretias has been rather varied, and I think others have had similar experience. It has been recommended to grow them in partial shade, though their leaves seem to indicate that they should be fully exposed. Perhaps the shading, if partial, may have conserved the moisture at the roots. Of course, Gladioli are plentiful now, though the rage for dwarf Cannas has affected their favor in many gardens. Personally I prefer the somewhat quaint and irregular forms of some of the Gladiolus species to the perfect hybrids of the florist, which are so proper and exact as to affect one as unpleasantly as some human beings with the same qualities. There is quite a list of flowers which I much enjoy in my friends' gardens. Some admirable Gladiolus are G. sulphureus, Leichtlini cruentus, aurantiacus, Eckloni, Byzantium and the hybrid G. Colvillei albus (The Bride). There seems to be a perennial discussion in horticultural circles as to the hardiness of Gladioli. After an experience with some fifty species I do not believe that, with the possible exception of G. Segetum and its near allies, any of the species are hardy in this latitude under ordinary treatment, and these only when the summer proves dry and the garden is well drained. They all evidently have a resting period of perfect dryness in a state of nature, and annual lifting is the only safe treatment with either the early or late flowering species. I have known odd bulbs to linger in the garden for several years, but they decrease in vitality and seldom even flower.

Elizabeth, N. J. *J. N. Gerard.*

The Forest.

The Burma Teak Forests.—VII.

Rate of Growth and Annual Yield.

TEAK, like other trees, grows rapidly in some, slowly in other localities. The researches which were made regarding rate of growth in the thirteen districts, for which, up to date, special working plans have been prepared, have led to the conclusion that on the hills Teak-trees grown up under the regime of the annual jungle fires attain four feet six inches in girth at an age between 100 and 115 years, while trees six feet in girth are between 134 and 156 years old. Hence the time which a second-class tree requires to attain first-class size may, under these circumstances, be accepted on an average at thirty-eight years. This, we have seen, is the period over which it is intended, under the working plans lately prepared, that the girdling of the present stock of first-class trees shall be spread. It has previously been mentioned that the districts here described comprise a few small blocks situated in the plains. Here the rate of growth is more rapid, but their area is small, and they may be neglected upon the present occasion.

As explained repeatedly, the annual yield of these forests has on three occasions been fixed—in 1856, 1868, and by means of the special working plans prepared between 1884 and 1892. In all cases was the yield based upon the estimated quantity of the growing stock of Teak of the different classes, and upon the rate of growth assumed at that time. The following figures give the annual yield fixed on these three occasions for the eleven forest districts in the Iraauddi valley and the time supposed to be required on an average for a second-class tree to attain first-class size:

The working plan of 1856 assumed 24 years and fixed the annual yield at	9,000 trees.
The working plan of 1868 assumed 72 years and fixed the annual yield at	5,800 "
The special plans, 1884 to 1892, assumed 38 years and fixed the annual yield at	11,230 "

Those who have to break fresh ground in the matter of regular forest management will understand the satisfaction which the writer of these lines feels, that in 1856, when the data then at his disposal led him to credit the Teak-tree with a rate of growth much too rapid, he yet fixed the annual yield below what the forests are capable of yielding. Regarding the number of trees actually girdled in these districts during the twelve years from 1856 to 1868, in accordance with the working plan of 1856, there is some doubt. The returns give 153 856 trees, or 12,821 a year. In these districts girdling operations were conducted in 1857 and 1858, when no competent officers were available for supervision, and there is ground for believing that a much smaller number than that reported were at that time actually girdled.

It must be distinctly understood that under the working plans lately prepared the number of trees actually girdled will, to some extent, also be regulated by area—that is, by the localization of girdling operations. The yield sanctioned by the plan for a particular district is a maximum, which must in no case be exceeded, and which must not be worked up to, if in the area assigned to a particular period the full number of trees that under the rules laid down for their selection may be girdled, cannot be found on that area. Thus, for the Thonzay forest district the plan of girdling has been laid down for a period of thirty years, divided into six sub-periods of five years each. To each sub-period have been assigned a number of compartments, in which during the five years fixed a maximum of 5,000 trees may be girdled. Thus, out of the 114 compartments nineteen have been assigned to the first sub-period (1885-9), while eleven compartments were assigned to the last sub-period (1910-14). In the compartments assigned

to the first sub-period the older trees prevail, while the younger trees are more numerous in the areas assigned to the last sub-period.

SELECTION OF TREES TO BE GIRDLED.

The rules for the selection of the trees to be girdled are similar to those which were laid down at the outset in 1856, but with some important points of difference. In 1856 there was no staff of officers available for the care of these forests, hence the selection of the trees to be girdled had to be regulated by a few broad general rules. The work had necessarily to be commenced on a large scale in an exceedingly rough manner. Gradually, as officers were appointed for the management of the different forest districts, the work was organized on a more systematic plan, hence in 1880, when I laid down the principles to be observed in the selection of the trees to be girdled within the demarcated reserves—that is, within the tracts intended to be permanently maintained as forest—the main point insisted upon was that each locality must be treated on its merits, and that by the removal of the trees girdled the reproduction of the Teak must not be impeded, but, if possible, be promoted. This principle necessitated a different treatment of patches where Teak prevails from those where it only forms a small proportion of the growing stock. Again, woods in which mature trees, those of the first class, prevail, would require a treatment different from those in which the smaller classes are more numerous. In the special working plans an important rule has been introduced which is in accordance with this principle. A distinction is made between Teak growing in moist forest, where the trees remain green until the end of February, and where consequently the rate of growth is somewhat more rapid than in dry forest, where the trees lose their leaves earlier in the season. And it has been provided, that while in dry forests the minimum size of the trees to be girdled remains six feet as heretofore, in moist forests no tree should be girdled that had not attained a girth of seven feet. These two classes of Teak-producing forest can most conveniently be distinguished by the species of Bamboos associated with the Teak-tree, Bambusa polymorpha being the species most common in the moist, while Dendrocalamus strictus prevails in the dry forest. It is obvious that under these special working plans the girdling operations are regulated with greater regard to the maintenance and improvement of the forests than was possible under the summary plans which at the outset were a necessity. In each district a number of compartments are assigned to one sub-period of five or six years, the maximum number that may be girdled in those compartments during that sub-period is fixed, and the selection of the trees to be girdled is governed by the peculiar conditions of each locality. Under these arrangements it was not necessary to maintain the original rule, that in one locality never more than one in four of the mature Teak-trees should be girdled. As an experiment this rule had already been set aside in 1868, and this was justified, because the annual yield of the forests at that time was fixed at a very low figure.

Bonn, Germany. *Dietrich Brandis.*

Exhibitions.

The Boston Flower Show.—II.

LAST week we had a general note on this admirable exhibition, with the names of some of the leading prize-takers. Large specimen plants were not abundant, but, in accordance with the tendency here and in Europe, there were many medium-sized plants and groups which, to a certain extent, fill their places, although one likes to see specimens of Clerodendron, Allamanda, Stephanotis and the like which have been grown with great care for years until they have attained stately proportions. Specimen flowering plants were few as compared with those whose value consists in form and foliage. The new Allamanda Williamsi, however, was well shown, and the fine specimen sent by N. T. Kidder, Esq., added much to the appearance of his group of plants. It is a very floriferous and graceful plant, and although the flowers are smaller than on some of the old varieties, they have the same rich golden color. It is easily propagated and will soon be in every collection. The Dipladenias shown by Mr. George McWilliams, especially two plants of D. amabilis, grown in large pans and trained to a globe frame, attracted special attention. They were elevated at the end of the hall and conspicuous under the electric lights, and well deserved the silver medal they received. These plants are among our best stove climbers, and the flowers are unexcelled in brilliancy of color. The specimens exhibited were grown in a compost of roughly broken peat and sharp silver sand, so that there was no danger of their ever becoming water-logged. Mr. McWilliams' Caladiums, especially plants of C. argyrites and a comparative novelty named C. minus erubescens, were especially noteworthy. In the magnificent group of stove and greenhouse plants from the Harvard Botanical Gardens, the best plants were one of Encephalartos horridus and Maranta (Calathea) Vanden Heckei, and a good example of the Boston strain of Nephrolepis exaltata. For a splendid specimen of the last-named Fern, six feet through, Mr. F. W. Fletcher received a certificate. In Mr. J. C. Bailey's collection a handsome plant of Maranta rosea lineata, which is considered difficult to grow, was good enough to receive a silver medal, while a Spherogyne latifolia, with panicles of lovely pink flowers, and a specimen of Cyanophyllum magnificum both attracted much attention. This last is one of the finest of stove evergreens, which, at its best, has leaves two and a half feet long, with a velvety midrib and ivory-white primary veins, reddish purple beneath. A striking specimen, Heliconia aureo-striata, was shown by John L. Gardener, Esq. (William Fletcher, gardener), and the Madagascar Lace Plant, always interesting, was shown by Mr. E. L. Converse, although, unfortunately, it was in a dark corner of the hall.

Every year it seems that aquatic plants have reached the summit of excellence, but every year there are novelties displayed which prove in some way better than the old sorts. These plants, favored by the heat of the past summer, never were seen in such abundance or in such good form at an exhibition in this country. In Mr. L. W. Goodell's collection there was a flower of Nymphæa rubra which left nothing to be desired in form or color. Of course, Mr. Brydon sent up from the Yarmouthport gardens of Mr. Simpkins an admirable collection which contained some of the newest and costliest of Mr. Marliac's creations. Nymphæa Robinsoniana is a remarkable flower of a deep orange-red, with a splashing of carmine, which makes it quite distinct from all others. These flowers are particularly striking when floating on the surface of the water in the sunshine. N. ignea is another superb Water-lily of a reddish purple, but so brilliant as to be almost dazzling in the sunshine. This plant does not seem to have a strong constitution, and, while it must be popular, it will probably be scarce and costly for some time.—[Mr. Marliac's hybrid, called Ignea, seems to flourish very well in England. Flowers which were open late in June in the water gardens of Gravetye Manor, the estate of William Robinson, Esq., were easily the brightest of all the Nymphæas then in bloom.—ED.] N. lilacina has a beautiful flower of a lilac tint and the peculiar fragrance of a Tea Rose. There were also remarkably good examples of N. Devoniensis, N. rubra, and particularly of N. pulcherrima, which showed a fine large flower of a beautiful soft blue. Of the Nelumbiums there were two vases of N. gracilis with white petals with golden stamens, and carried on long stout stalks, which last well when cut. These flowers are delightfully fragrant, the odor resembling that of Lily-of-the-valley. One of the new French hybrids was Nymphæa fulgens, shown by Oakes Ames, Esq. (Carl Blomberg, gardener), with flowers somewhat resembling N. ignea in color. In this collection were also flowers of several varieties heretofore mentioned, as well as of the varieties, Exquisita and Caroliniana, of our native N. odorata. The display which William Tricker brought from the gardens of Henry A. Dreer, the Philadelphia seedsman, showed thirty-five varieties of Nymphæa and Nelumbium and a flower of Victoria regia. The new Nymphæa O'Marana was well shown, and so was N. Deaniana and N. Kewensis, the last of which has been especially good, owing, undoubtedly, to the warm summer. This was true of all the tropical Nymphæas in the collection, but, although the hardy varieties were well represented, they showed the effect of the lateness of the season more than those from collections three or four hundred miles to the north. Nelumbium striatum showed extremely well, combining a robustness and free-flowering quality. N. Kermesiana is another handsome and strong-growing plant with a pink flower. All these flowers were grown in the open water, which again demonstrates their usefulness and the adaptability of both the hardy and the tropical varieties for all purposes in gardens large or small, public or private. The fact that the flowers in Mr. Dreer's collection had been cut for thirty-six hours and shipped from Philadelphia, and after this made a creditable display, is sufficient evidence of their value for cutting.

Notes.

Owing, perhaps, to the abundance of rain this summer, Clematis paniculata is flowering very freely near this city. For some reason its flowers expanded a week later than usual, but now many plants are completely covered with them. We

know one specimen that covers a trellis more than twelve feet square, in which the flowers completely hide the foliage, and it makes a picture that arrests the attention of all who pass it.

How to thin out the apples from overloaded trees so as to leave only enough fruit to attain its best development is a difficult problem. Mr. Charles A. Green, of Rochester, sets a man with an ordinary steel garden rake to pull the fruit from his trees, and when he has gone as high as he can reach he uses a stepladder for the upper branches. This seems like a rough-and-ready way of doing work which requires a good deal of judgment, and certainly none but a careful and intelligent man should be entrusted with it. If any one knows of a way to thin more quickly and judiciously we should be very glad to hear of it.

In response to our recent inquiry on this page as to the experience of persons who have grown the Japanese Wineberry, we have received a note from Mr. E. H. Burson, Superintendent of Green's Nursery Company, Rochester, who writes that the plant has been fruiting with them for about five years. It is hardy and prolific; the berries average as large as those of the Ohio, and those which have been sold command from ten to twelve cents a quart, which is the price of the best red raspberries. Mr. Burson calls it the handsomest raspberry on their grounds; it is of a bright color, and although a little tart, it is delicious, especially when used with sugar as other berries are.

Mr. J. G. Jack will conduct a series of lectures and field meetings at the Arnold Arboretum, beginning on September 19th and closing November 7th, for the purpose of supplying popular instruction about the trees and shrubs growing in New England. The class meets in the lecture-room of the Bussey Institute for the review of certain groups of trees and shrubs, and will then make an informal outdoor study of the plants. The purpose of the course is to indicate by comparison the easiest means of distinguishing common native trees and shrubs and to recognize foreign species which have been introduced into gardens. An hour and a half to two hours will be devoted to each meeting, which will be held on Saturdays at ten o'clock and Wednesdays at three. Applications or inquiries may be addressed to Mr. J. G. Jack, Jamaica Plain, Massachusetts.

The Japanese Knotweed, Polygonum cuspidatum, becomes an aggressive weed at times. It is too obtrusive, for example, in Central Park, but where it can be kept within bounds in a damp place it makes a striking clump of foliage six feet high, and during August and September it is covered with its beautiful sprays of white flowers. Its relative, P. Sachalinense, about the value of which as a forage plant so much discussion has lately taken place, is now recommended for planting in the Sahara on the borders of the small areas where vegetation already flourishes. These areas are said to be much more numerous than it was once thought they were, and this Knotweed is commended as able to endure the drought and as a good plant to bind the sand. Our experience with the plant is that it likes to get at water in the subsoil, and we should fear that it would not flourish in a desert.

Professor Halsted, of New Brunswick, writes to *The American Florist* that he has observed a spot on the leaves of Nymphæas for some time, but not until this year has he received specimens of affected leaves as an evidence that the disease was causing some alarm. This spot is caused by a species of Cercospora, but one which is not yet recorded. As shown in an engraving the spots are small, circular and numerous, the affected portions soon becoming sunken and bearing multitudes of spores on the upper side. These germinate rapidly, and as it is not improbable that the spores get into the water and in this way are distributed to all parts of the pond, the infection spreads quickly. Experiments will be made with fungicides upon this new pest, but it is plain that the conditions are so unlike those of terrestrial plants that it is not safe to predict results. Professor Halsted asks for specimens of diseased leaves in order that he may make further studies of the blight.

Mr. Joseph Meehan advises those who wish to plant trees and shrubs this year not to wait until the leaves fall, but as soon as the wood is well ripened to strip off the leaves and then to plant the trees. The soil at this season is warm, often warmer than the air, and this condition encourages the immediate throwing out of fibrous roots. Mr. Meehan writes to *The Rural New Yorker* that if the leaves are left on a few twigs of the tree they will drop off in a few days, and this will guarantee the success of the work. If they do not drop, but wither on the stem, this is a sign that the tree has not thrown out roots and that it will not probably live. The tree should be set in the hole, the earth filled in, and if the soil is rather dry it will make little difference, because in this condition it can be rammed tightly around the roots until the hole is three-fourths full. Then water should be poured into the hole and the remaining soil thrown in later without much ramming. What a tree needs to assist in forming new roots is a warm moist soil.

Among pears now arriving from California are Beurre Hardy, Beurre Clairgeau, Beurre d'Anjou, the highly flavored White Doyenne, the brownish red Louise Bonne of Jersey, Duchesse d'Angouleme, Bartlett, Seckel, the very large Souvenir du Congrés, the roundish pyriform Howell, the juicy white flesh having a vinous flavor, and Onondaga, or Swan's Orange, originated in Connecticut. Of these, Bartletts are the most popular, and sell at retail from twenty-five to seventy-five cents a dozen, the latter price buying extremely large and firm specimens. Some of the Seckel pears from California are unusually large and beautifully colored, and retail for the highest prices. Seckel pears from New York state cost seventy-five cents for a ten-pound basket. Salway and Piquet's Late peaches are now coming from California. Some fine examples of the well-known Stump the World are being received from the highlands in Maryland; also of Morris White, a favorite variety for preserving with brandy, and Smock Freestone, valued for preserving on account of its moderately juicy flesh. Of a dozen kinds of plums from the Pacific coast now offered here, Kelsey's Japan is the handsomest and the richest in flavor. This fruit has steadily gained in popular favor since its introduction in 1884. Some of these plums are a rich yellow and heart-shaped, while others are a deep red and apple-shaped. They are good keepers, and are at their best when thoroughly ripe and almost translucent. Many are extremely large, and the best command $1.00 for a basket containing two dozen. Large Red Nectarines, beautifully colored and said to be the finest ever seen here, cost $1.25 for a box containing two dozen. The choicest and showiest apples of this season are Alexander, Duchess of Oldenburg, Twenty-ounce Pippins and Maiden's Blush. Flame Tokay, Muscatel and Rose de Peru grapes are now at their best, and were included in forty-five car-loads of California fruits sold at auction in this city last week. Delaware, Niagara, Worden and Concord grapes, from this state, are now plentiful and cheap. New grape-fruit, from Jamaica, costs $1.00 to $1.50 a dozen.

A certain Rhode Island Greening Apple-tree in an orchard a mile north of Lake Erie last year produced ordinary fruit on the north-east side, while that on the south-west half were of mixed character, each apple being partly a Greening and partly a Talman Sweet. The two varieties appeared in sections for the most part corresponding to the carpels. In some examples three sections, or three-fifths of the apple, were Greening and two-fifths Talman Sweet, while in others the proportions were reversed. In others one-fifth was Greening, and in others still the proportion of Talman Sweet was smaller yet. The different parts were in most cases easily distinguished by the color and by the greater protuberance of the Greening as forming a part of a larger apple, and the flavor of the different parts was as distinctly those of different apples as if they had grown on separate trees. The line of separation, though not very definite, in most cases corresponded with the divisions between the carpels and ran to the summit of the apple, except that a small part around the summit seemed in every case to be Greening. A short distance to the south-west of this tree stands a Talman Sweet tree, so that it is probable that this phenomenon is due to cross-fertilization between the pollen of the Talman Sweet and the ovule of the Greening. This account was written for a late number of *Science* by Mr. T. H. Lennox, of Woodstock, Vermont, and Professor L. H. Bailey, who had the privilege of examining samples of the apples, testifies that they seem to give incontrovertible evidence of the immediate effect of cross-fertilization. Of course, some interesting questions arise, and Mr. Lennox wonders why the pollen, which acts directly upon the ovule, should so profoundly affect the receptacle and calyx which make up the fleshy part of the apple. Equally difficult, too, is it to understand why cross-fertilization, which one would think must frequently occur in Apple-trees, should in this instance produce mixed fruits, while in a thousand cases it has no appreciable effect whatever. Professor Bailey adds that he had never before been convinced that such immediate effect in flavor and other varietal characteristics could occur, but he is now satisfied that this is possible, although it is certainly rare, and therefore exceptional.